
STRUCTURAL WELDING INSPECTION: 2019 CBC

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Division of the State Architect (DSA) documents referenced within this publication are available on the [DSA Forms](#) or [DSA Publications](#) webpages.

PURPOSE

This Interpretation of Regulations (IR) clarifies minimum requirements and responsibilities for personnel conducting structural welding inspection on projects under DSA’s jurisdiction.

- See *IR 17-2: Non-destructive Testing (NDT) of Structural Welds* for information about nondestructive testing (NDT) of welds.
- See *IR 17-9: High-Strength Structural Bolting Inspection* for information on high-strength bolting (HSB) inspection.

SCOPE

This IR is applicable to both shop and field structural welding inspection activities. The welding inspection provisions herein do not apply to “non-structural” welded elements as identified by the design professional in the DSA-approved construction documents (e.g., items marked as exempt from DSA special inspection requirements in the Appendix of form *DSA 103: List of Structural Tests and Special Inspections*, etc.).

BACKGROUND

The California Building Code (CBC) requires either periodic or continuous special inspection of structural welding. Special inspection of structural welding shall be conducted in accordance with CBC, applicable reference standards (e.g., American Welding Society [AWS] D1.1 or D1.2 or D1.3 or D1.4 or D1.8, as applicable, American Institute of Steel Construction [AISC] 360, AISC 341, etc.) and the requirements of this IR. In accordance with *IR A-8: Project Inspector and Assistant Inspector Duties and Performance*, the project inspector shall coordinate scheduling with the welding special inspector or Laboratory of Record (LOR), as applicable, to ensure material verification, sampling, testing, and required reports of welded components occurs.

1. CONTINUOUS VS. PERIODIC SPECIAL WELDING INSPECTION: The CBC calls for “continuous” and “periodic” inspection. These terms, as applicable to structural welding, are defined in CBC Section 202 and further clarified below.

- 1.1 Continuous:** The welding inspector’s full-time continuous presence during all phases (except material identification, which is verified as described in Section 3.1.2 below), shall provide for inspection in a timely manner, before subsequent operations are performed. Continuous inspection is required for all welds as identified in CBC Tables 1705A.2.1 and 1705A.3.
- 1.2 Periodic:** The welding inspector’s intermittent presence shall provide for inspection in a timely manner, before subsequent operations are performed. Periodic inspection is allowed as identified in CBC Tables 1705A.2.1 and 1705A.3. The inspector must be present at the start of welding, intermittently during welding operations and at the completion of each welding operation. All inspection duties described in Section 3 below apply without exception.

2. QUALIFICATIONS: Welding inspectors shall meet all of the following requirements:

- 2.1** Hold valid certification identified in CBC 1705A.2.5, or;
- Hold valid certification from the Canadian Welding Bureau (CWB) Level 2 or Level 3 as defined by the Canadian Standard Association (CSA) Standard W178.2.

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- 2.2** Meet the minimum age and experience requirements specified in the California Administrative Code (CAC) Section 4-335(f).
- 2.3** Possess knowledge of the special inspection and reporting requirements of CAC Section 4-335, special welding inspection requirements of CBC, and applicable reference standards.
- 3. INSPECTION DUTIES:** The following duties apply to both continuous and periodic structural welding inspection: (**NOTE:** Proprietary products may require inspection and testing requirements beyond those listed below.)
- 3.1 Prior to Welding:**
- 3.1.1** Review and understand the applicable portions of the DSA-approved construction documents (e.g., plans, specifications, construction change documents, etc.). Accepted shop drawings, erection drawings and referenced codes and standards must also be reviewed and understood. (Note that shop/erection drawings are NOT DSA-approved documents and shall NOT be used as a basis for determining weldment conformance).
- 3.1.2** Review manufacturer's Material Test Report (MTR). Verify that all material properties (e.g., grade, type, size, thickness) are as specified by the DSA-approved construction documents, and that all materials are readily identifiable and traceable to the MTRs. Sample any unidentifiable material for testing by the Laboratory of Record (LOR).
- 3.1.3** For seam welds in hollow structural sections (HSS), conduct a thorough visual examination of the seam weld area for visible discontinuities. Visual examination should include, as a minimum, the exterior of the seam weld and the interior at each end.
- 3.1.4** For structural plate, conduct a thorough visual examination of edge surfaces for any visible lamination discontinuities.
- 3.1.5** Verify that all applicable welder, welding operator and tack welder qualifications are available, current, and conform to AWS and project specific requirements.
- 3.1.6** Verify that a written Welding Procedure Specification (WPS) is available on site for each type of weld, that the WPS is in compliance with project and AWS requirements, and that the WPS has been approved if required by the construction documents.
- 3.1.7** Witness any required Procedure Qualification Tests for non-prequalified welds and verify that applicable existing Procedure Qualification Records (PQRs) conform to AWS and project specific requirements.
- 3.1.8** Verify that all welding consumables comply with the DSA-approved documents and the approved WPS. Verify that all electrode materials are properly stored.
- 3.1.9** Verify that the welding current and voltage are within the WPS parameters by using a calibrated hand-held volt/amp meter. Readings should be taken as near the arc as possible. This equipment shall be owned and maintained by the LOR. Evidence of annual calibration shall be part of the LOR's quality system and available upon request.
- 3.2 During Welding:**
- 3.2.1** Verify that joint preparation, assembly practice, preheat temperatures, interpass temperatures, welding techniques, welder performance and post-weld heat treatment meet the requirements of the DSA-approved documents, WPS and AWS.
- 3.2.2** Conduct visual inspection of the work: verify size, length and location of all welds. Verify that all welds conform to the requirements of the AWS code and the DSA-approved documents. Weld size and contour shall be measured with suitable gauges.
- 3.2.3** Mark completed welds, parts and joints that have been inspected and accepted with a distinguishing mark, tag, or dye stamp. The inspector's mark shall be placed near the fabricator's

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piece mark and be visible throughout the steel erection process. Inspector's mark shall include: the special inspector's initials, inspection date and testing laboratory identification (if applicable).

Note: The special inspector shall attach metal identification tags or suitable marks on completed parts that are specified to be galvanized or paint coated. Tags or marks shall include the "inspector's mark" information above, be durable enough to withstand the coating process, be legible, and be traceable to related inspection reports.

3.2.4 If completed welds require testing by nondestructive methods, schedule or notify those responsible for the nondestructive testing (NDT) in a timely manner, after visual inspection and acceptance is complete, and the assembly has cooled. All NDT shall be performed by qualified Level II personnel employed and supervised by a laboratory evaluated and approved for that purpose by DSA. See IR 17-2 for further information regarding NDT.

4. REPORTING:

4.1 Each special inspector shall provide detailed daily inspection reports that clearly describe the work inspected in accordance with Section 3 above, *IR 17-12: Special Inspection Reporting Requirements*, and CAC 4-335(f)4 to the project inspector and others indicated to receive such reports. A special inspection report template (form *DSA 250: Special Inspection Report*) is available on DSA's website. Any rejected welds, parts, or joints that are not repaired shall be brought to the contractor's and project inspector's attention immediately.

5. FAILURE TO PERFORM: Failure to inspect the work in a professional and competent manner, report defective work, file all required reports in a truthful and timely manner, or fulfill any other duties defined by the code may result in withdrawal of the welding special inspector's DSA acceptance and/or withdrawal of the LOR's DSA acceptance (reference CAC 4-335.1(c)). This includes but is not limited to the withdrawal of acceptance or approval to work on any current or future projects under DSA jurisdiction.

REFERENCES:

2019 California Code of Regulations (CCR) Title 24

Part 1: California Administrative Code (CAC), Section 4-335

Part 2: California Building Code (CBC), Sections 1705A.2, 1705A.2.1, 1705A.2.2, 1705A.2.3.1, 1705A.2.5, 1705A.3.1, 2204A.1 and Tables 1705A.2.1 and 1705A.3

This IR is intended for use by the DSA staff and by design professionals to promote statewide consistency for review and approval of plans and specifications as well as construction oversight of projects within the jurisdiction of DSA, which includes State of California public schools (K-12), community colleges and state-owned or state-leased essential services buildings. This IR indicates an acceptable method for achieving compliance with applicable codes and regulations, although other methods proposed by design professionals may be considered by DSA.

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